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UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

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*Ex parte* TOBY SMITH

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Appeal 2007-3123  
Application 10/619,700  
Technology Center 2600

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Decided: February 20, 2008

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Before ROBERT E. NAPPI, MARC S. HOFF, and KEVIN TURNER  
*Administrative Patent Judges.*

NAPPI, *Administrative Patent Judge.*

DECISION ON APPEAL

This is a decision on appeal under 35 U.S.C. § 6(b) of the final rejection of claims 1 through 7, 9 through 16, and 18.

We affirm the Examiner's rejections of these claims.

INVENTION

The invention is directed to a sound generating device which makes use of a piezoelectric actuated diaphragm that is supported at the nodal

fulcrum of the diaphragm. See page 3 of Appellant's Specification. Claim 1 is representative of the invention and reproduced below:

1. An acoustic generating device, comprising:  
a piezoelectric material;  
a metal diaphragm bonded to the piezoelectric material and having a nodal fulcrum;  
an electric circuit connected to the piezoelectric material that electrically activates the piezoelectric material; and  
mounting devices constructed of insulating material and positioned at the top and bottom of the metal diaphragm wherein the mounting devices support the metal diaphragm at the nodal fulcrum with an adhesive.

#### REFERENCES

Byrne	US 4,330,729	May 18, 1982
Nakagawa	US 4,430,529	Feb. 7, 1984

#### REJECTIONS AT ISSUE

Claims 1 through 7, 9 through 16, and 18 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Byrne in view of Nakagawa.

Throughout the opinion, we make reference to the Brief (received August 21, 2006), Reply Brief (received January 12, 2007) and the Answer (mailed November 15, 2006) for the respective details thereof.

#### ISSUES

Appellant contends that the Examiner's rejection of claims 1 through 7, 9 through 16, and 18 under 35 U.S.C. § 103(a) is in error. Appellant argues, on pages 6 through 9 of the Brief, that art cited by the Examiner does not teach a piezoelectric device that is mounted on a nodal ring by using an

adhesive on both sides as claimed. Appellant asserts that Nakagawa in the embodiment of figure 5 teaches a support adhered to the diaphragm on one side. (App. Br. 7, Reply Br. 5-7). Further, Appellant argues that while Nakagawa teaches in the figure 6 embodiment that elastic bodies are adhered to the upper and lower sides of the diaphragm, there is no mention of them being adhered to the protuberances (support members) (App. Br. 7, 8; Reply Br. 8-10). Further, Appellant argues that the protuberances are not for support but rather to modify the sound emitted. (App. Br. 8). Appellant asserts that Byrne's teaching of a support for a piezoelectric diaphragm, which is easily assembled, teaches away from gluing the supports to the diaphragm, as the glue requires time to cure. (App. Br. 8-11).

The Examiner states in response:

Byrne does teach the mounting devices (20, 22, 24, 30) supporting the metal diaphragm at the nodal fulcrum (col. 3, lines 34-49 and lines 66-68 through col. 4, lines 1-25, and figures 2 and 5). Further, Byrne shows the mounting devices (20, 22, 24, 30) that are positioned at the top and bottom surfaces of the diaphragm, and using an adhesive for securing the diaphragm to a support surface of a piezoelectric device is known in the art. Nakagawa teaches an adhesive for connecting the mounting devices to the upper surface and lower surface of the diaphragm (col. 3, lines 29-31 and 59-66, col. 4, lines 42-44, and see figures 6-9).

(Answer 4).

Further, the Examiner concludes that one skilled in the art would glue the diaphragm "for a [*sic*] reliably keeping stationary the mounting devices to the diaphragm at the node ring." (Answer 4).

Thus, the contentions of Appellant present us with the issue of whether the Examiner erred in determining that the combination of the references teaches support members for a piezoelectric diaphragm, where the support members are on the top and bottom of the diaphragm, located at

a nodal fulcrum and adhered to the diaphragm as claimed. We consider this issue only as it applies to claim 1. Appellant's arguments on pages 6 through 12 of the Brief are directed to claims 1 through 7, 9 through 16, and 18 as a group. Thus, in accordance with 37 C.F.R. § 41.37 (c)(1)(vii) we group claims 1 through 7, 9 through 16, and 18 together and select claim 1 as representative of the group.

#### FINDINGS OF FACT

1. Byrne teaches a support arrangement for a piezoelectric sound generating element. (Abstract).
2. Byrne's support arrangement is for use with a sound generating element that has a metal diaphragm and a piezoelectric element. (Col. 1, ll. 15-26, col. 3, ll. 6-14).
3. The sound generating element has a nodal ring, or area where at a selected frequency the diaphragm will flex around the ring, and the ring will remain stationary (i.e. a nodal fulcrum in the shape of a ring). (Col. 3, ll. 34-55).
4. Byrne teaches supporting the diaphragm using two support members (upper and lower) positioned at the node ring of the diaphragm. (Col. 4, ll. 1-8, 20- 36).
5. The portions of the support arrangement that hold the upper and lower support members lock together and clamp the diaphragm between the support members. (Col. 2, ll. 13-18).
6. Nakagawa teaches a piezoelectric speaker in which the center of the piezoelectric diaphragm is supported thus allowing higher sound pressure levels to be generated by the speaker. (Abstract).

7. Nakagawa teaches several embodiments in which the center of the diaphragm is secured.
8. In the embodiment of figure 5, the diaphragm is supported from only the lower side, and the diaphragm is adhered to the support member item 17. (Nakagawa, col. 3, ll. 29-34).
9. In the embodiment of figure 6, the diaphragm is supported above and below, by elastic bodies items 21 and 22, which are stuck (adhered) to the diaphragm. (Nakagawa, col. 3, ll. 61-65).
10. Nakagawa teaches an alternative to sticking the bodies (items 21 and 22) to the diagram is to merely insert them between the frame and diaphragm (i.e. items 21 and 22 remain in place by clamping pressure). Thus, the skilled artisan would recognize that Nakagawa teaches that adhering supports to the diaphragm performs the equivalent function as clamping the diaphragm with the supports. (Col. 4, ll. 24-33).

#### PRINCIPLES OF LAW

On the issue of obviousness, the Supreme Court has recently stated that “the obviousness analysis cannot be confined by a formalistic conception of the words teaching, suggestion, and motivation.” *KSR Int’l Co. v. Teleflex Inc.*, 127 S. Ct. 1727, 1741 (2007). Further, the Court stated “[t]he combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results.” *Id.* at 1739.

When a work is available in one field of endeavor, design incentives and other market forces can prompt variations of it, either in the same field or a different one. If a person of ordinary skill can implement a

predictable variation, § 103 likely bars its patentability. For the same reason, if a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill. . . . [A] court must ask whether the improvement is more than the predictable use of prior art elements according to their established functions.

*Id.* at 1740. “One of the ways in which a patent’s subject matter can be proved obvious is by noting that there existed at the time of the invention a known problem for which there was an obvious solution encompassed by the patent’s claims.” *Id.* at 1742.

#### ANALYSIS

Independent claim 1 recites “mounting devices constructed of insulating material and positioned at the top and bottom of the metal diaphragm wherein the mounting devices support the metal diaphragm at the nodal fulcrum with an adhesive.” We note that claim 1 does not recite a nodal ring as argued by Appellant. Nonetheless, we find that the scope of claim 1 includes that there is a top and bottom support adhered to the metal diaphragm at a nodal fulcrum.<sup>1</sup>

Appellant’s arguments have not persuaded us that the Examiner erred in determining that the combination of the references teaches support

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<sup>1</sup> We note that as claims 1 and 10 discuss both mounting devices being attached to the diaphragm, i.e. the claims are limited to the embodiment where the piezoelectric material does not extend to the nodal fulcrum. This creates ambiguity with claims 5 and 14, which recite that the mounting devices are attached to the piezoelectric material. Further, claims 6 and 15, which recite the mounting device is attached to the diaphragm with adhesive, do not appear to further limit claims 1 and 10. Should there be further prosecution in this application, Appellant and the Examiner are encouraged to correct these issues.

members for a piezoelectric diaphragm, where the support members are on the top and bottom of the diaphragm, located at a nodal fulcrum and adhered to the diaphragm. We find that Byrne teaches a support structure for a diaphragm of a piezoelectric device where the diaphragm is supported on top and bottom at the nodal ring. (Fact 4). Byrne teaches that these supports hold the diaphragm by clamping the diaphragm between the two supports. (Fact 5). Nakagawa teaches that an alternative to using clamping force is to adhere the supports to the diaphragm. (Fact 10). Thus, we consider using adhesives to adhere the supports to the diaphragm to be nothing more than the combination of familiar elements, which are known to perform equivalent functions, and which do nothing more than yield predictable results (*i.e.*, using adhesive will have the predictable result of providing support to the diaphragm).

Appellant's arguments that Nakagawa does not teach an embodiment where supports are adhered to both sides of the diaphragm has not persuaded us of error. As identified by the Examiner, in the embodiment of figure 6, the elastic members 21 and 22 are adhered to the diaphragm. (Fact 9). Whether or not they are adhered to the protuberances (items 13a and 14a) is of no consequence, as members 21 and 22 function to restrain movement of the center of the diaphragm (Facts 6 and 7); thus, they support the diaphragm in the center (*i.e.*, they provide support in the vertical axis regardless of their adherence to items 13a and 14a). Further, as Nakagawa teaches that these supports can be adhered or just inserted in place, Nakagawa teaches that adhering the supports provides an equivalent function to clamping. (Fact 10).



Further, Appellant's arguments that Byrne's teaching that the device can be quickly assembled teaches away from using adhesive is not persuasive. As discussed above, there is ample evidence of record to show that clamping and adhering with adhesive provide equivalent functions. We find no evidence of record that adhering the diaphragm would so significantly increase the assembly time of the housing that one would be discouraged from using adhesive. Further, that the use of adhesive involves a cure time is of no consequence, as adhesives are available with a variety of cure times. Additionally, one skilled in the art would recognize that using adhesives in Byrne's device would not require the adhesive to cure during the assembly process, but rather that the adhesive cure before using the device.

For the forgoing reasons, Appellant's arguments have not persuaded us of error in the Examiner's rejection of representative claim 1. Accordingly, we affirm the Examiner's rejection of claims 1 through 7, 9 through 16, and 18 under 35 U.S.C. § 103(a) as being unpatentable over Byrne in view of Nakagawa.

#### CONCLUSION

We affirm the Examiner's rejections of claims 1 through 7, 9 through 16, and 18. Should there be further prosecution of this application, the Appellant and the Examiner are encouraged to correct the ambiguities noted in claims 5, 6, 14 and 15.

#### ORDER

The decision of the Examiner is affirmed.

Appeal 2007-3123  
Application 10/619,700

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv).

AFFIRMED

gvw

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